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WITNESS my hand this
Thirteenth day of January 2005

A handwritten signature in dark ink, appearing to be 'LM' or similar initials.

LEANNE MYNOTT
MANAGER EXAMINATION SUPPORT
AND SALES

AUSTRALIA
Patents Act 1990

PROVISIONAL SPECIFICATION

Invention Title: **Panel constructions and assemblies made therefrom**

The invention is described in the following statement:

PANEL CONSTRUCTIONS AND ASSEMBLIES MADE THEREFROM

The present invention relates to a novel support panel and containers or similar products assembled therefrom.

BACKGROUND OF THE INVENTION

5 It is known to form panels, containers or objects from a variety of materials and constructions. Commonly used materials include wood including plywood, cardboard including corrugated cardboard, expanded polystyrene, polyurethane, glass, and rigid and semi-rigid plastics including corrugated plastic board and the like. Each of these materials has certain advantages for particular applications
10 but most also have disadvantages making their use at best a compromise in many applications. For example, wood is a relatively expensive material that is difficult to fabricate into panels, containers or crates. Panels, containers and crates made from wood are also generally quite heavy. Cardboard is relatively inexpensive both as a material and in fabricating same into a container or the like,
15 however, it is not waterproof. Polystyrene formed into a container, box or crate is expensive to freight because of its volume. Wood including plywood and rigid or semi-rigid plastics provide limited or no protection against damage to products packed inside such containers and provide limited thermal insulation qualities.

SUMMARY OF THE INVENTION

20 The present invention aims at providing an inexpensive novel object or panel construction and assemblies utilising such an object or panel construction including containers and the like, that will overcome many of the aforementioned difficulties with known materials and constructions.

Accordingly, the present invention provides an object or panel construction
25 including an inner support frame means and an outer skin at least partially enclosing said support frame means formed at least in part by a plurality of layers of at least one flexible web wound about said support frame means whereby at least some of said layers are adhered to other said layers. Preferably the outer skin may fully enclose the support frame means. Preferably, at least one said
30 flexible web may be a plastics film. Conveniently, the outer skin may be made completely of one or more flexible plastics film webs, or it may be made of plastics film web and at least one other web, for example of a reinforcing mesh or other material. The object or panel construction accordingly may provide,

depending on the embodiments utilised, a relatively lightweight panel construction that is inexpensive to produce and which may be waterproof and may also provide protection for the goods that might be packed in a container utilising such panel constructions.

5 Preferred features of the object or panel construction may be as defined in claims 2 to 30 annexed hereto, the subject matter of these claims being hereby incorporated into the disclosure of this specification by the reference thereto.

As used in this specification, the terms "support frame means", "frame element" and the like are intended to convey a meaning of both a continuous
10 support element such as, for example, a sheet of corrugated cardboard or similar, or an open frame with an outer perimeter support defining a largely open space in between, either being generally planar in form or three dimensional in form.

The present invention also anticipates utilizing panel constructions as described above in an assembled form to provide a container or a wall
15 construction for various applications as defined in claims 31 to 48 annexed hereto. The subject matter of these claims is also incorporated into the disclosure of this specification by this reference thereto.

The present invention also provides apparatus for wrapping a support frame means with an outer skin formed at least in part by a plurality of layers of a
20 flexible web wound about said support frame means, said apparatus including a first conveying means and a second conveying means, the first and the second conveying means being arranged to move the support frame means to and fro between the first and second conveying means, and a roll of said flexible web disposed between the first and the second conveying means being movable
25 between a relatively elevated position and a relatively lowered position, the flexible web being successively positioned along a first face of the support frame means with the roll of said flexible web in the elevated position as the support frame means moves between the first and the second conveying means, whereupon, the roll of said flexible web moves to the lowered position and the
30 flexible web is positioned along a second face of the support frame means opposite to said first face as the support frame means moves again between the first and the second conveying means.

Preferred features and aspects of the aforementioned apparatus may be as defined in claims 50 to 53 as annexed hereto, the subject matter of these claims being, by this reference thereto, incorporated into the disclosure of this specification.

5 BRIEF DESCRIPTION OF THE DRAWINGS

Many other applications for the panel construction of this invention will become apparent from the following description of preferred embodiments given in relation to the accompanying drawings, in which:

Fig 1 is a schematic front view of a panel construction according to a
10 preferred embodiment of the present invention;

Fig 1a is a section view along line A-A of Fig 1;

Fig 2 is a schematic perspective view of a container utilising a plurality of panel constructions as shown in Fig 1;

Fig 2a is a partial section view along line A-A of Fig 2;

15 Fig 2b is a partial section view along line B-B of Fig 2;

Fig 2c is a partial section view along line C-C of Fig 2;

Figs 3a to 3f are section views of possible elements for forming the perimeter rigid frame formation of panel constructions according to preferred embodiments of the present invention;

20 Fig 4 is a schematic perspective view of a possible wall configuration for utilising panel constructions according to the present invention, particularly for forming a container on a pallet base;

Fig 4a is a partial section view along line A-A of Fig 4;

Fig 4b is a partial section view along line B-B of Fig 4; and

25 Fig 5 is a schematic plan and side elevation view of one possible apparatus for producing panel constructions according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figs 1 and 1a of the annexed drawings illustrate, by way of example only, one possible preferred embodiment of the present invention. In this embodiment
30 a panel construction 10 is provided with a rigid perimeter frame 11 and an outer skin 12 totally enclosing the frame 11. The outer skin 12 is made up of layers of flexible plastics material film wound onto the frame 11 with the layers being at least partially adhered to one another. Conveniently, at least one such layer of

film web might be wound onto the frame 11 in a first cross direction with at least one further layer of the film web being wound onto the frame 11 in a second cross direction transverse to said first cross direction. If desired, two or more layers of the film web may be wound in the first cross direction prior to winding at least one or conveniently two or more layers in the second cross direction. Preferably, the angle between said first and second cross directions is between 60° and 120°, and most preferably at about 90°. It is preferred that the flexible plastics material web be slightly greater in width than the width of the frame 11, however, if the frame 11 is larger in size than the available film web width, then the film web may be spirally wound onto the frame 11 with the web being applied overlapping a previously applied web length. Alternatively, the film may be applied in a plurality of partially overlapping spaced sections. The number of layers of film web applied to the frame 11 to form the outer skin 12 may be varied to achieve a desired strength and other performance characteristics for the intended use of the panel construction. The film web forming the outer skin 12 may be self adhesive plastics film which may have had an adhesive additive included in the film material formulation, or the film might be coextruded film including at least two layers in which one outer layer is formed by an adhesive resin. In a still further possible arrangement, an adhesive might be applied to or coated on a surface of the film prior to or during its application to the frame 11 to form the outer skin 12. In another possible arrangement, a laminating adhesive layer might be applied between non-adhesive layers of flexible web material.

If the frame 11 is totally enclosed by the outer skin 12, air is initially trapped in the cavity or space 13 within the frame 11. Further air may then be trapped with each subsequent wrap of film web either in the cavity 13 or between the layers of the film web. By repeating this process, the desired insulating properties and/or cushioning properties can be achieved for the panel construction 10. If the film web is applied with pressure to the frame 11, the pressure applied to the frame by the film tends to increase the seal between layers of the film web to trap the air in the cavity 13 and/or between the layers as described above.

It has also been found that by applying the film web loosely or dimpling the film web prior to or as it is applied will cause more air to be trapped between the

layers of the outer skin 12, if this is desired. A further possible option is to provide a dimpling or similar effect on inner or intermediate layers of the film web with smooth or flat film web layers applied as outer layers to improve the outward appearance of a panel construction formed in this manner.

- 5 The pressure of the air remaining in the cavity 13 may, if desired, be controlled by perforating one or both sides of the outer skin 12 or the layers of the outer skin 12 to ensure that the air within the cavity 13 remains at atmospheric pressure regardless of its temperature when used.

10 The panel construction 10, in one preferred arrangement may be weatherproof and/or waterproof and can be used for external applications or internal applications where the panel construction or product made therefrom, might be subject to degradation by excessive moisture levels. A panel construction in accordance with this aspect where the internal cavity 13 is sealed, at least on one side, might be used in applications such as a raft or other floating
15 uses such as a cover for swimming pools and other water holding facilities. A plurality of such panels could also be formed together to form such devices as rafts or floating covers for pools and the like.

20 In Figs 1 and 1a, the frame 11 is fabricated from a metal such as steel or aluminium (or alloys thereof), or perhaps from a rigid or semi-rigid plastics material having an L-cross-section 14 as shown in Figs 3a and 3b. The length of the legs 15, 16 of the L-section members 14 might be the same or could be different, however, if a container such as is shown in Fig 2 is to be produced, then it is preferable that the legs 15, 16 be of equal length. In use the outer skin 12 forms a bevelled surface 17 between the outer edges of the legs 15, 16.
25 Alternatively, a triangular section such as shown in Fig 3d might be used which presents a surface 18 over which the outer skin 12 might be formed equivalent to the bevelled surface 17. Fig 3c shows another triangular section for the members 14 which presents a pair of bevelled surfaces 19, 20 over which the outer skin 12 might be formed. Fig 3e shows a possible semi-circular cross-section having an
30 outer curved surface 21 over which the outer skin might be formed. It is believed this section improves the sealing of the film web layers to one another if this characteristic is desired. Fig 3f illustrates another possible rectangular (or square) cross-section presenting an outer square or flat surfaces 22, 23 and 24

over which the outer skin 12 might be formed. A similar effect with a lower weight level might be achieved utilising a channel or C-section with the legs of the C-section facing inwardly or outwardly. While Figs 1 and 1a show one preferred embodiment utilising a square (or rectangular) rigid perimeter frame 11, it will be appreciated that, depending upon the application, other shapes might be employed including triangular shapes and other polygonal shapes. The frame 11, as shown in Figs 1 and 1a, is illustrated as being fabricated from individual members 14, however, it may in some applications be moulded or cast in one piece. The frame 11 needs to be sufficiently rigid to support the outer skin 12 of flexible plastics material web applied to it but the material used to form the frame 11 could vary depending upon the application and depending upon whether the frame 11 is to be recycled or reused as discussed below. Suitable materials, depending upon the application, might include metals and metal alloys, timber, formed cardboard, rigid plastics material, a flexible inflatable plastics material or combinations of the aforesaid materials.

Figs 2, 2a, 2b and 2c schematically illustrate a container or box 25 having a base wall 28 (see Fig 2c), from upstanding side walls 26 (two of which are shown) and a lid or closure wall 27. Each of the base, side and upper closure walls may be formed by a panel construction 10 as illustrated in Figs 1 and 1a. It will be appreciated that by varying the shape and the dimensions of the panel constructions 10, containers of differing sizes and shapes might be produced. Many variations are possible including but not limited to providing a container without an upper closure or lid, and providing polygonal (other than square or rectangular) containers by providing a polygonal shaped base wall (and, if required, lid) with rectangular (or square) side walls connected to each side of the polygonal shaped base wall. With the preferred embodiment illustrated in Fig 2, the panel constructions 10 each have bevelled edge faces 17 disposed at 45° to the plane of the panel construction such that adjacent panel constructions form a 90° corner with the bevelled edge faces 17 contacting one another (see Fig 2a). The side walls 26 may be hingedly connected to the base wall 28 by the use of adhesive tape 29 applied substantially fully along the adjacent edges of the panel constructions.

In the upright or assembled condition of the container or box 25, the side walls 26 are maintained adjacent one another by releasable fastening means 30 such as a Velcro (registered trade mark) fastening tab or the like. The lid or upper closure wall 27 might be simply loosely applied or it may be connected to a side wall 26 by hinging tape 31. When the container is packed, each of the adjacent edges of the panel construction might be secured by sealing tape. If desired, one or more releasable fastening means (such as tabs 30) might be applied to releasably secure the lid or upper closure wall 27 in the closed state.

In an alternative arrangement, the panel constructions 10 forming the container might be temporarily held in the finished or erect state and thereafter have a further layer or layers of plastics material film web wound around the container to secure same in the erect state. Alternatively, adhesive tape material or strapping material could also be used to hold the container in the erect state. This may include the side walls and base wall only or might also include the upper lid or closure wall. If desired, advertising, promotional or other printed material might be provided on a sheet placed on an outer wall surface of a panel construction with the sheet being retained in place by an outer layer or layers of clear or transparent plastics material film web wound around the panel construction. Alternatively, if the container is to be formed as described above with an outer wrapping of plastics material film web, then the printed material sheet might be located between this outer wrapping (if it is clear or transparent) and the previously formed panel constructions.

As will be apparent, containers of the above described type might be readily shipped to an end user in a flat condition to be erected, packed and secured in a suitable manner. Containers may be shipped either as individual panel constructions or as such panel constructions hingedly connected to one another. It is believed that the rigid perimeter frames 11 might be formed and arranged in adjacent formation to be wrapped with plastics material film web simultaneously such that the plastics material film web will form hinging and connection means between panels intended to form a container or the like.

Figs 4, 4a and 4b illustrate another product in which a panel construction 10 might be used. In this preferred embodiment a container is formed on pallet construction 40 of any suitable type having a supporting base wall 41. Corner

posts 42 might be releasably positioned at the corners of the base supporting wall 41 with each of the corner posts 42 having channel members 43 secured thereto with the open channel 44 of the channel member 43 facing along a side or end edge of the supporting base wall 41. If desired, a base channel member 45
5 having its open channel 46 facing upwardly is positioned along each side or end edge of the base wall 41. The base channel members 45 may also be releasably connected to the pallet construction 40. As is shown in the drawing, a pallet construction 10 might be positioned and retained in the open channels 44 and 46 of the channel members 43 and 45. With larger panel constructions 10 as might
10 be needed in this application, it may be desired to provide at least one internal strengthening rib or bar traversing the internal cavity 13 in at least one direction with opposed ends of same being connected to a portion of the rigid perimeter frame 11.

In another preferred embodiment the internal frame structure might be
15 formed by cardboard or corrugated cardboard or moulded plastic with crease lines being positioned to allow the panel construction to be folded about same in use. The internal frame structure might then be wrapped with a flexible plastics film web (or webs) in one (or two) directions about the edges of the internal cardboard or plastic frame with overlapping layers being at least partially adhered
20 to one another. Such a construction might typically be used as supporting and protective packaging for individual bottles such as wine bottles or the like.

In a still further preferred embodiment, a container for retaining, carrying, transporting or storing liquids and flowable materials may be produced utilising a structure comprising an internal support frame defining an internal space or zone
25 with the frame being wound with flexible plastics material film in a plurality of layers. In the case of the frame and therefore, the container, being cuboid in shape, the plastics material web may be wound about the frame in three directions disposed at 90° to each other to completely cover the six faces of the cuboid shape to form a sealed zone within the outer skin. An opening can then
30 be formed in one face of the outer skin to provide an access means for filling and dispensing liquid or particulate material from the container. The opening may further include resealable closure means if desired.

Fig 5 illustrates schematically one possible form of apparatus for manufacturing objects or panel constructions 10 as described in the preceding text. It will of course be appreciated that many other forms of apparatus might be used including manual and semi-manual techniques. The top portion of Fig 5 is a plan view of the apparatus with the lower portion being a side elevation view. The illustrated apparatus 50 includes three pairs of conveyors 51/52, 53/54 and 55/56, with the conveyors in each pair confronting one another with a work space in between adapted in use to receive a rigid perimeter frame 11 in between the conveyors. The conveyor pairs 53/54 and 55/56 are adapted to pass the frame 11 between the respective pairs as indicated by arrows 57 as described hereafter. Between the respective pairs of conveyors 53/54 and 55/56, a roll 58 of flexible plastics material film web is positioned to apply the film web to the frame 11 essentially as it moves by the conveyor pairs and between the conveyor pairs. The roll of film 58 is also movable vertically as indicated by arrow 60. Finally the pair of conveyors 53/54 may be bodily rotatable about the pivot axis 61 such that they might cooperate with the pair of conveyors 55/56 or with a separate pair of rollers 51/52 utilising another film roll 59 movably similarly to the roll of film 58.

Reference will now be made to the lower part of Fig 5 as annexed hereto. With the frame 11 initially in the left hand illustrated position with a film web 62 positioned along a lower face of the frame 11 and the roll 58 in the lower position 63, the roll 58 is moved vertically to its upper position 64 and the frame 11 is moved to its right ultimately to the position illustrated at 11'. In this position, the film web 62 has been positioned along the upper face of the frame 11. At this point the film roll 58 is moved again to its lower position 63 and the frame 11 is moved to the left hand position by the conveyor pairs 55/56 and 53/54. In so doing a second layer of film web is applied over the first laid layer along the lower face of the frame 11. The process is repeated to apply the desired number of layers of the film web 62 to the frame 11. When this has been completed, the film web 62 is severed and the conveyor pair 53/54 is rotated through 90° about axis 61 carrying with it the partially wrapped frame 11. The wrapping process is then repeated with the partially wrapped frame 11 being again passed between conveyor pairs 53/54 and 55/56 with the film web 62 from roll 58 being applied at

an angle of substantially 90° to the first laid web. It will of course be appreciated that the same effect may be achieved without the conveyor pair 53/54 being bodily rotatable about the axis 61, by similarly removing the partially wrapped frame 11 and manually or semi-manually reorienting the frame 11 to the 90° position before repositioning same between the conveyor pairs 53/54. If it is desired to conveniently apply a differing film or other web material 65, a second pair of confronting conveyors 51/52 may be provided, 90° disposed relative to the conveyors 53/54, with a roll 59 of the required film or web material 65 disposed between the conveyor pairs 51/52 and 53/54. The roll 59 is disposed at 90° to the first roll 58 and is movable in a similar manner to the first roll 58. In a still further possible arrangement, four pairs of confronting conveyors might be provided with the first and second pairs being disposed at 90° to the third and fourth pairs of conveyors. The frame 11 in such an arrangement would be wrapped in a first direction by cooperation of the first two pairs of conveyors and an intervening roll of film, before being passed between the second and the third pairs of conveyors to thereafter be wrapped in a second direction by an intervening roll of film or web material between the third and fourth pairs of conveyors. In any of the above embodiments, the process of wrapping in separate directions might be repeated as many times as desired. Preferably each of the webs 62/65 has a width slightly greater than that of the frame 11 with press means (not shown) to press the extending edge portions against side edges of the frame 11. Conveniently the arrangement of each conveyor pair such as the illustrated pairs 51/52, 53/54 and 55/56 might be adjustable to accommodate differing thickness, width and length frames 11.

In a still further aspect, because the panel constructions 10 or container 25 formed therefrom has air trapped in the cavity 13 and/or between the film layers, such panel constructions and containers formed therefrom have excellent heat insulation properties. This would be an advantage and/or necessity when the containers are used for frozen or chilled produce, for example in manufacturing refrigerated containers, replacing Styrofoam for packaging fresh or frozen fish or produce or large produce bins used in a coolstore. The panel constructions could be used for temporary housing remaining cool in the summer and retaining heat

in the winter. The same would apply for greenhouses because the panel constructions are insulated, heating and/or cooling costs would be greatly reduced. The panel constructions could also be used as insulation in buildings replacing other insulation methods. Because the volume of film is low per square
5 metre the amount of flammable material is minimal although it may be preferable to at least treat the external layers of film with a fire retardant additive. In relation to a possible fire risk, there is substantially less material to burn when compared to Styrofoam or polyurethane.

If the panel constructions were to be used for more permanent building or
10 other structures, they could be coated with plaster, render, rigid plastic, steel or aluminium sheeting or some other appropriate finish for example in refrigerated containers, coolstores, insulated building structures *etc.* In the case of such containers or panels because the insulation is film and air and the film acts as a support, such panel constructions and containers have a much reduced weight
15 when compared to other known constructions thus leading to much lower freight cost and building loadings.

In a further aspect, because the walls of the container or the panel construction are made with flexible film and are filled with air, products packed in such containers are in contact with flexible walls and base and are therefore
20 better protected than in other containers or panels. Similarly, when the container does include a lid, the lid may be similarly constructed providing a similar improved level of protection for the container contents. Thus a container made in such a manner could be used as a protective package for whitegoods and other breakable and/or valuable products. This would also be important when packing
25 and storing fruit and vegetables as there are minimal solid surfaces to bruise or damage such produce. Smaller containers could be used for packaging wine bottles or the like.

In a further important aspect, the main cost in the production of such panel constructions or containers is the framing material and fabrication of the frame. It
30 is therefore highly desirable that after use or damage the panels or containers are either re-wrapped over the existing film or the film is stripped off and the frames are simply wrapped again to produce another panel or container using the same

framing material. Thus containers or panel constructions made as described above are reusable and recyclable for many years.

5 In another aspect, panel constructions utilising waterproof materials for the frame 11 makes it possible to store and run liquids in such frames or the panel constructions. Such panel constructions can be used for storing, heating, solarisation and purification of water. They can also float on dams, canals *etc.* to reduce evaporation.

10 In a still further aspect, the frame 11 may be wrapped with a plastic film that will shrink when subjected to an elevated temperature whereby such panel constructions may be passed through an oven or over or past heating means to shrink the film onto the frame 11. The resultant panel or other object will have an improved taut and smooth outer surface.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An object or panel construction including an inner support frame means and an outer skin at least partially enclosing said support frame means formed at least in part by a plurality of layers of at least one flexible web wound about said support frame means whereby at least some of said layers are adhered to other of said layers.
2. An object or panel construction according to claim 1 wherein said support frame means is a single frame element.
3. An object or panel construction according to claim 1 wherein said support frame means includes at least two frame elements, the or each said frame element being spaced apart and wound by said flexible web or webs such that the flexible web or webs between adjacent frame elements forms a hinge means.
4. An object or panel construction according to claim 2 wherein said single frame element includes at least two parts interconnected by hinge means.
5. An object or panel construction according to claim 4 wherein the single frame element is a cardboard element including at least one crease line forming said hinge means.
6. An object or panel construction according to any one of claims 1 to 5 wherein the inner support frame means is fully enclosed by said outer skin.
7. An object or panel construction according to claim 6 wherein the flexible web or webs are wound in at least two directions disposed at a different angles relative to each other.
8. An object or panel construction according to claim 7 wherein the flexible web or webs are wound in at least three directions disposed at different angles relative to each other.

9. An object or panel construction according to claim 7 or claim 8 wherein the two different directions of the web or webs forms an angle of between 60° and 120°.
- 5 10. An object or panel construction according to claim 7 or claim 8 wherein the angle is substantially 90°.
11. An object or panel construction according to any one of claims 1 to 10 wherein the outer skin includes at least one layer of a flexible plastics film forming said flexible web or webs.
- 10 12. An object or panel construction according to claim 11 wherein the outer skin includes multiple layers of said flexible plastics film.
13. An object or panel construction according to claim 11 or claim 12 wherein the object or panel construction is passed through or by heating means to heat shrink the flexible plastics film onto said support frame means.
- 15 14. An object or panel construction according to claim 11 or claim 12 wherein air is trapped and retained within said outer skin.
15. An object or panel construction according to any one of claims 11 to 14 wherein said outer skin is perforated at one or more locations.
16. An object or panel construction according to any one of claims 11 to 15 wherein air zones are trapped between said layers of said flexible plastics film.
- 20 17. An object or panel construction according to any one of claims 11 to 16 wherein the flexible plastics film web or webs include self adherent characteristics.
- 25 18. An object or panel construction according to any one of claims 1 to 17 wherein a separate adhesive or adhesive layer is used to adhere the layers of the flexible web or webs together.

19. An object or panel construction according to any one of claims 2, 3 or 4 wherein the or each said frame element includes a perimeter rigid frame formation defining a substantially open space inwardly of said perimeter rigid frame formation.

5 20. An object or panel construction according to claim 19 wherein the or each said frame element includes at least one strengthening web traversing said substantially open space, the or each said strengthening web being connected at opposed ends to the perimeter rigid frame formation.

10 21. An object or panel construction according to claim 19 or claim 20 wherein the perimeter rigid frame formation is moulded or cast as a single piece.

22. An object or panel construction according to claim 19 or claim 20 wherein the perimeter rigid frame formation is fabricated from a plurality of parts connected to one another.

15 23. An object or panel construction according to any one of claims 19 to 22 wherein the perimeter rigid frame formation includes a portion with an outer edge zone adapted to form at least one bevelled edge region when the outer skin of said plastics film web or webs has been wound thereon.

24. An object or panel construction according to claim 23 wherein the bevelled edge region or regions extends fully around the perimeter rigid frame formation.

20 25. An object or panel construction according to any one of claims 19 to 22 wherein the perimeter rigid frame formation includes a portion with an outer edge zone adapted to form a convex curve when the outer skin of said web or webs has been wound thereon.

25 26. An object or panel construction according to any one of claims 19 to 22 wherein the perimeter rigid frame formation includes a portion with an outer edge zone adapted to form a square or rectangular edge form when the outer skin of said web or webs has been wound thereon.

27. An object or panel construction according to any one of claims 19 to 26 wherein the outer skin is not perforated to provide a sealed space therein.

28. An object or panel construction according to any one of claims 19 to 27 wherein the perimeter rigid frame formation defines a polygonal shape.

5 29. An object or panel construction according to claim 28 wherein the polygonal shape is rectangular or square shape.

30. An object or panel construction according to claim 28 or claim 29 wherein a printed sheet is sandwiched between inner layer or layers and an outer layer or layers of said outer skin, at least the outer layer or layers being transparent
10 whereby said printed sheet is viewable.

31. A container constructed from a panel construction according to any one of claims 1 to 30.

32. A container formed from at least four panel constructions according to claim 28, one of said panel constructions forming a base wall and the other said
15 panel constructions forming side walls.

33. A container according to claim 32 wherein the panel constructions are connected together via hinge means such that the container can be transported in a substantially flat condition and erected into said container by an end user.

34. A container according to claim 33 wherein releasable fastening means is
20 provided to enable said panel constructions intended to form adjacent said side walls to be releasably connected to each other.

35. A container according to any one of claims 32 to 33 wherein the container includes a said panel construction forming a lid element for the container.

36. A container according to any one of claims 32 to 35 wherein at least one of said panel constructions includes a printed sheet outwardly covered and retained by at least one layer of a transparent flexible plastics material web.

5 37. A container according to claim 36 wherein said at least one layer of a transparent plastics material web forms part of a said panel construction.

38. A container according to claim 36 wherein said at least one layer of a transparent plastics material web also forms an overwrap to connect and hold said panel constructions in an erect container configuration.

10 39. A wall construction element including at least one rectangular shaped panel construction according to any one of claims 1 to 30 further including retainer means engaging and retaining opposed edges of said panel construction.

40. A wall construction element according to claim 39 wherein at least three edges of said panel construction are held by said retainer means.

15 41. A wall construction element according to claim 39 or claim 40 wherein the retainer means includes a rigid channel shaped member extending substantially fully along the engaged and retained edge of the panel construction.

42. A container arrangement formed on a pallet base including a plurality of wall construction elements according to any one of claims 39 to 41.

20 43. A container arrangement according to claim 42 wherein the wall construction elements are selectably removable from said pallet base.

44. A container arrangement according to claim 42 or claim 43 wherein the panel construction elements are selectably removable from said rigid channel shaped members.

25 45. A wall construction element including at least one rectangular shaped panel construction according to any one of claims 1 to 30 further including one or

more rigid or semi-rigid material sheets connected to the inner support frame means and substantially covering the whole of at least one side face of the panel construction.

5 46. An object including an inner support frame means defining a substantially open region within outer perimeter dimensions of said inner support frame means and an outer skin at least partially enclosing said inner support frame means formed by a plurality of layers of at least one flexible web wound about said support frame means whereby at least some of said layers are adhered to other of said layers.

10 47. An object according to claim 46 in the form of a panel defining a sealed zone within the outer skin, the sealed zone having a resealable inlet / outlet opening whereby the sealed zone can hold and retain a liquid.

15 48. A container formed from an object according to claim 46 wherein the flexible web or webs are plastics material film wound about said support frame means in at least two directions to define a sealed zone within the support frame means and at least one inlet / outlet opening being formed in one wall of the container to enable a liquid or flowable particulate material to be retained in said sealed zone.

20 49. A container according to claim 48 wherein the support frame is wound in at least three directions by said plastics material film.

50. A container according to claim 48 or claim 49 wherein the support frame means includes convex curved surfaces facing outwardly of the sealed zone over which the plastics material film is wound.

25 51. Apparatus for wrapping a support frame means with an outer skin formed at least in part by a plurality of layers of a flexible web wound about said support frame means, said apparatus including a first conveying means and a second conveying means, the first and the second conveying means being arranged to

move the support frame means to and fro between the first and second conveying means, and a roll of said flexible web disposed between the first and the second conveying means being movable between a relatively elevated position and a relatively lowered position, the flexible web being successively positioned along a first face of the support frame means with the roll of said flexible web in the elevated position as the support frame means moves between the first and the second conveying means, whereupon, the roll of said flexible web moves to the lowered position and the flexible web is positioned along a second face of the support frame means opposite to said first face as the support frame means moves again between the first and the second conveying means.

52. Apparatus according to claim 51 wherein at least one of said first or said second conveying means is bodily repositionable about a rotation axis disposed at 90° to the plane of movement of the support frame means between the first and the second conveying means.

53. Apparatus according to claim 52 wherein a third conveying means is provided to move the support frame means in a direction 90° to the direction of movement between the first and the second conveying means, the third conveying means being cooperable with the first or the second conveying means that is bodily repositionable about said rotation axis, a second roll of flexible web being mounted for selective movement between elevated and lowered positions and disposed between said third conveying means and the first or the second conveying means that is bodily repositionable about said rotation axis.

54. Apparatus according to claim 51 wherein at least two rolls of a said flexible web is positioned between the first and the second conveying means, each of said rolls being movable between a said elevated position and a said lowered position.

55. Apparatus according to claim 51 wherein the roll is movable in an axial direction as the flexible web is applied to said support frame means.

DATED this 23rd day of January 2004

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FIRST GREEN PARK PTY LTD

WATERMARK PATENT & TRADE MARK ATTORNEYS
290 BURWOOD ROAD
HAWTHORN VICTORIA 3122
AUSTRALIA

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P23618AUP1 SKP/JC

fig 2c

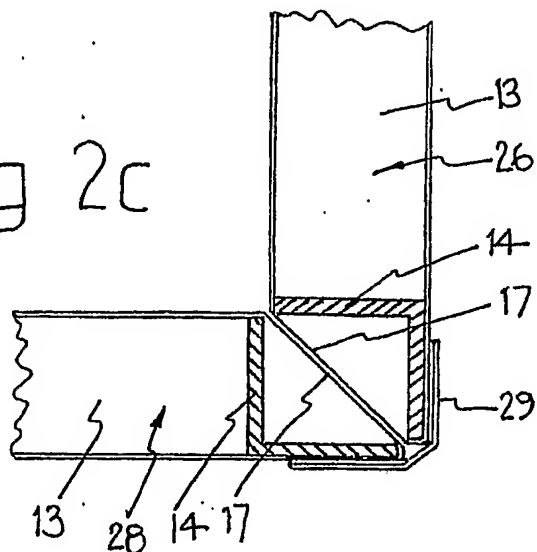


fig 1a

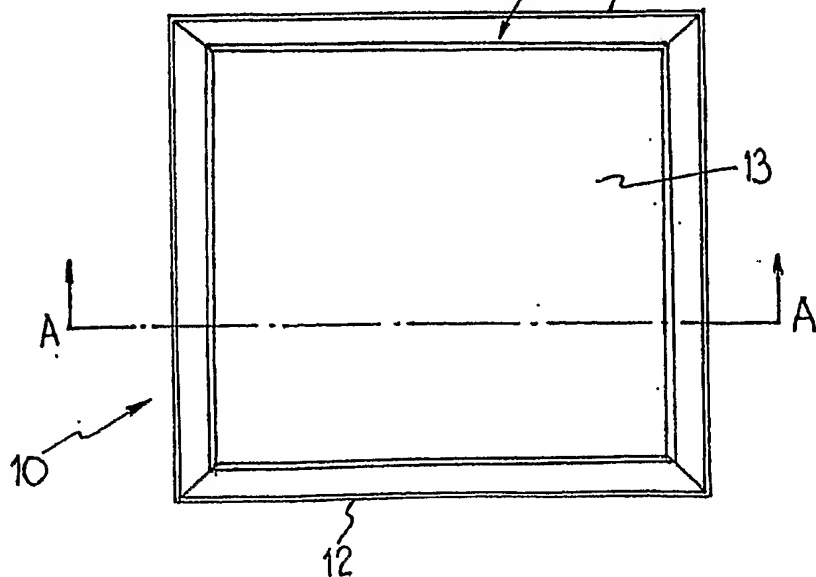
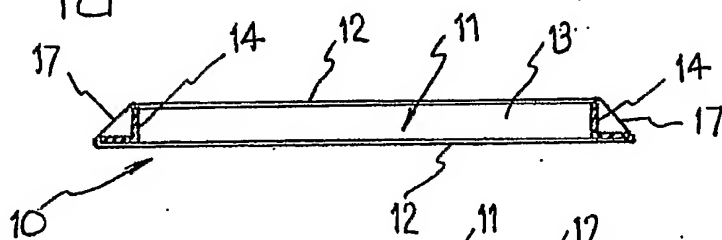


fig 1

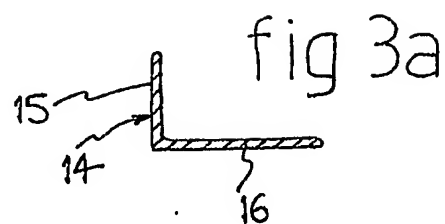


fig 3a

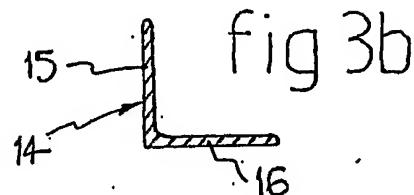


fig 3b

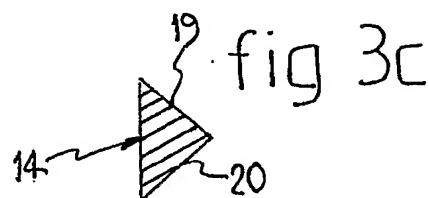


fig 3c

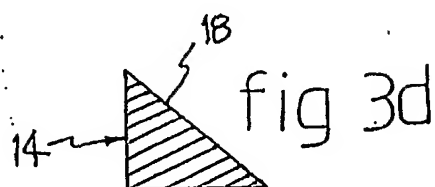


fig 3d

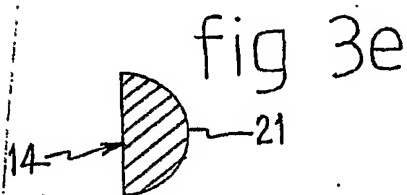


fig 3e

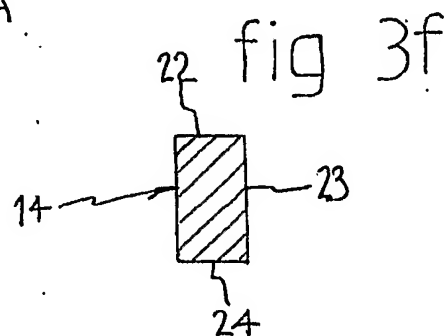


fig 3f

fig 2

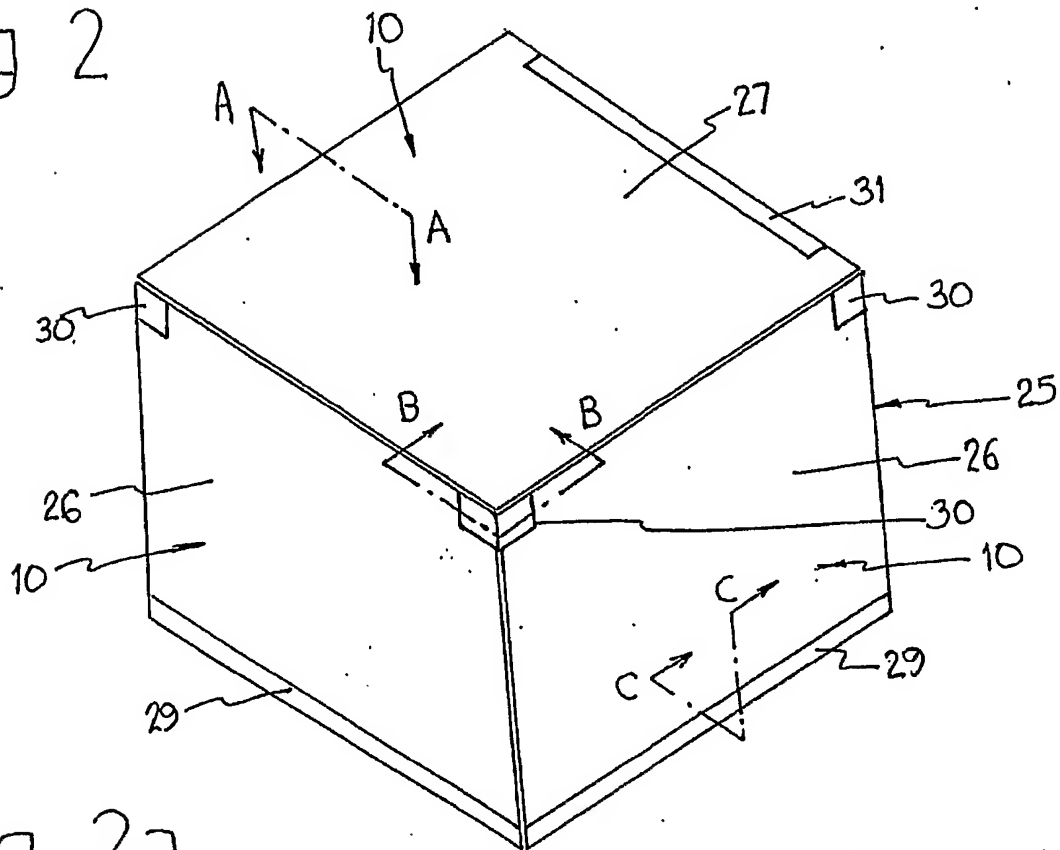


fig 2a

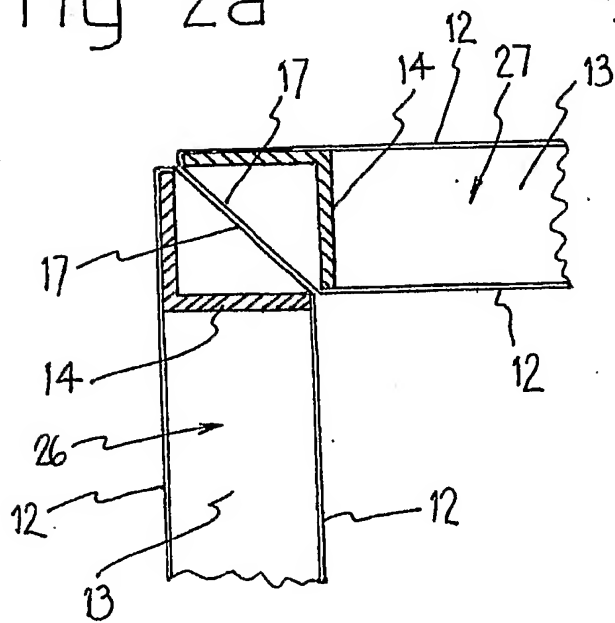


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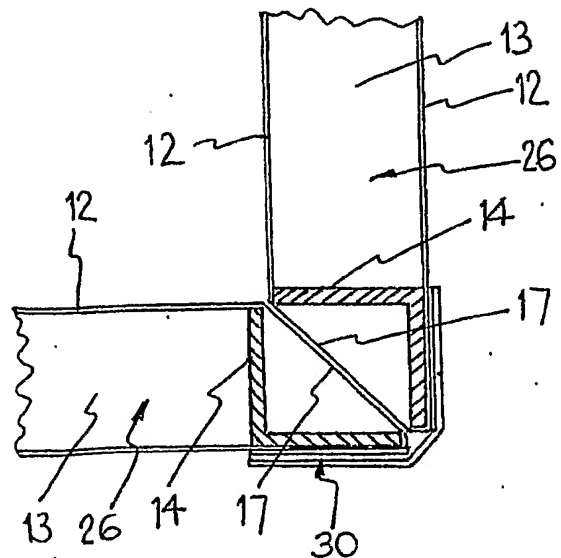


fig 4

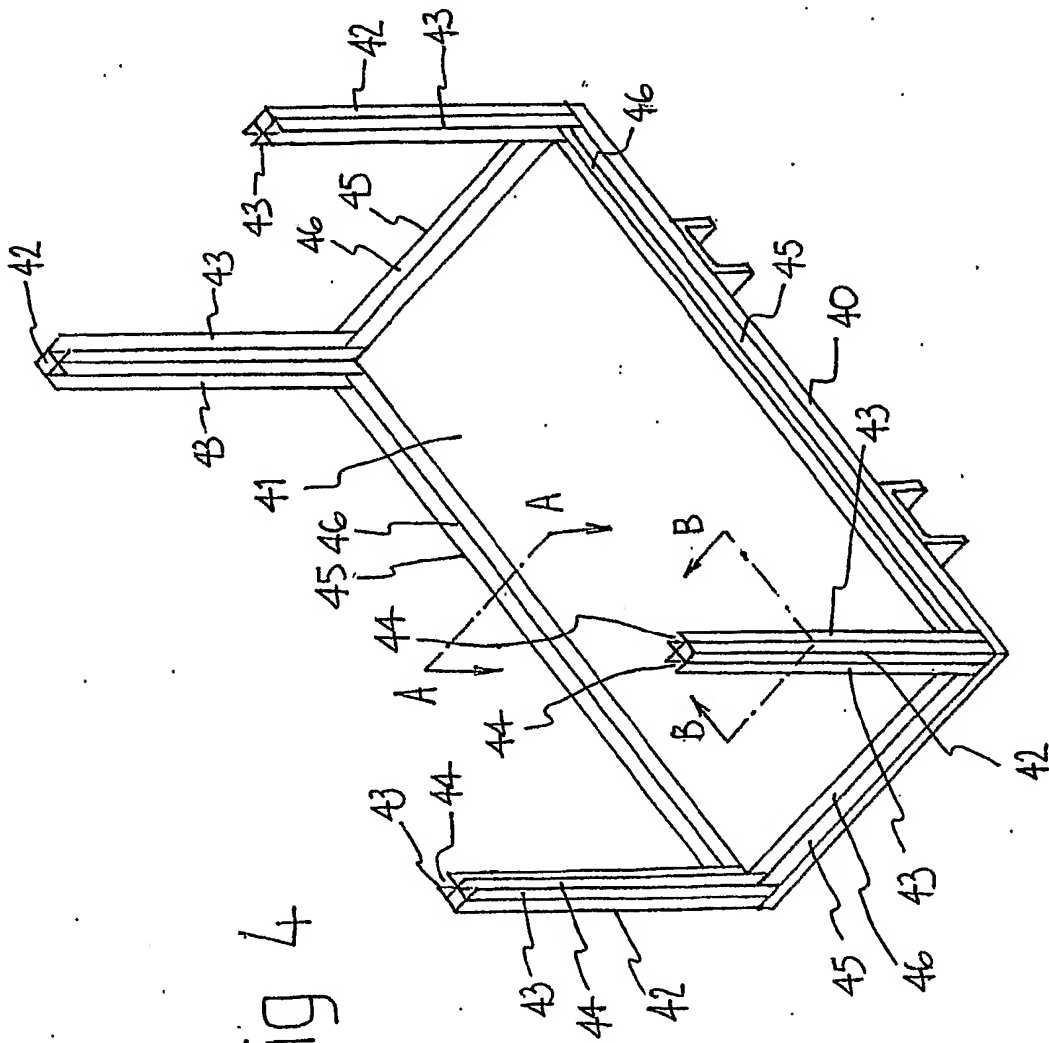


fig 4a

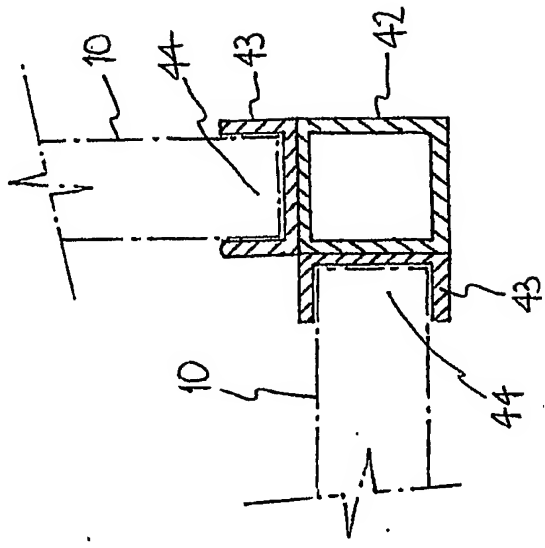


fig 4b

